SOIL EVALUATION SUMMARY

TESTS BY: ALEXANDER PARKER (LIC. #1848) ON 3-18-08 , 6-24-08 AND 4-23-09

WITNESS: JOHN COULON, TOPSFIELD HEALTH AGENT

TEST HOLES 1-4 EVALUATED ON 3-18-08; PERCS T2, T3 AND T4 PERFORMED ON 6-18-08; TEST HOLE 09A-09D AND PERC 09-1 PERFORMED OM 4-23-09

DEEP OBSERVATION HOLE LOG
Deep Hole No. 1 Depth to Groundwater: 80" Depth to Bedrock: 94"+
Estimated Seasonal High Water Table : 44" Common, medium and distinct

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other Structure, Stones, Boulders, % Gravel
0-14	Ap	SANDY LOAM	10YR 3/2 dark grayish brown		Friable. med. blocky. weak grade, fine grained, damp fine grass roots, smooth clear boundary
14-24	Bw	SANDY LOAM	7.5YR 4/4 brown		Friable. med.angular blocky. weak grade, fine grained, damp,fine grass roots, diffuse wavy boundary
24-67	C1	LOAMY SAND	2.5Y 5/4 light olive brown	@44" 10Y 7/1 7.5 YR 3/6 (c,2,d)	V. Friable, structurelesss, moderate grade, fine to med. grained, damp, gritty, weakly stratified
67-94	C2	SAND	10YR 4/6 Dark yellow brown		Loose, structurless, med. to coarse grained, stratified and well graded, saturated below 69", 15% gravel

DEEP OBSERVATION HOLE LOG
Deep Hole No. 09A Depth to Groundwater: >110" Depth to Bedrock: >110"
Estimated Seasonal High Water Table : ND

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other Structure, Stones, Boulders, % Gravel
0-15	C	Sand & Loam Mix	10YR 3/2 very dark gray	ND	Human transported material, very friable, structureless damp, mechanical mix of sand, gravel & loam
15-23	C1	SANDY LOAM	2.5Y 6/4 brown	ND	Very friable. massive blocky(med), fine grained, damp moderately silty, slightly gritty, diffuse wavy boundary
23-70	C2	SAND	10YR 5/6 dark yellowish brown	ND	Structurless,loose, fine o med. grained sand,, damp weakly stratified, clean, 15-20% gravel, diffuse wavy boundary
70-110	C3	SAND	2.5Y 4/6 Dark yellowish brown	ND	Structurless, loose, med. to coarse grained sand, damp lacking stratification, clean, 10-15% gravel

DEEP OBSERVATION HOLE LOG
Deep Hole No. 2 Depth to Groundwater: 65" Depth to Bedrock: 89"+
Estimated Seasonal High Water Table : 38" Common, medium and distinct

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other Structure, Stones, Boulders, % Gravel
0-15	Ap	SANDY LOAM	10YR 3/2 dark grayish brown		Friable. med. blocky. weak grade, fine grained, damp fine grass roots, smooth clear boundary
15-21	Bw	SANDY LOAM	7.5YR 4/4 brown		Friable. med.angular blocky. weak grade, fine grained, damp,fine grass roots, diffuse wavy boundary
21-37	C1	LOAMY SAND	2.5Y 5/4 light olive brown	@38" 10Y 7/1 7.5 YR 3/6 (c,2,d)	V. Friable, structurelesss, moderate grade, fine to med. grained, damp, gritty, weakly stratified
37-89	C2	SAND	10YR 4/6 Dark yellow brown		Loose, structurless, med. to coarse grained, stratified and well graded, saturated below 69", 15% gravel

DEEP OBSERVATION HOLE LOG
Deep Hole No. 09B Depth to Groundwater: >110" Depth to Bedrock: >110"
Estimated Seasonal High Water Table : ND

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other Structure, Stones, Boulders, % Gravel
0-32	C	Sand & Loam Mix	10YR 3/2 very dark gray	ND	Human transported material, very friable, structureless damp, mechanical mix of sand, gravel & loam
32-45	C1	SANDY LOAM	2.5Y 6/4 brown	ND	Very friable. massive blocky(med), fine grained, damp moderately silty, slightly gritty, diffuse wavy boundary
45-110	C2	SAND	10YR 5/6 dark yellowish brown	ND	Structurless,loose, fine o med. grained sand,, damp weakly stratified, clean, 15-20% gravel, diffuse wavy boundary

DEEP OBSERVATION HOLE LOG
Deep Hole No. 3 Depth to Groundwater: 53" Depth to Bedrock: 87"+
Estimated Seasonal High Water Table : 39" Common, medium and distinct

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other Structure, Stones, Boulders, % Gravel
0-15	Ap	SANDY LOAM	10YR 3/2 dark grayish brown		Friable. med. blocky. weak grade, fine grained, damp fine grass roots, smooth clear boundary
15-22	Bw	SANDY LOAM	7.5YR 4/4 brown		Friable. med.angular blocky. weak grade, fine grained, damp,fine grass roots, diffuse wavy boundary
22-48	C1	LOAMY SAND	2.5Y 5/4 light olive brown	@39" 10Y 7/1 7.5 YR 3/6 (c,2,d)	V. Friable, structurelesss, moderate grade, fine to med. grained, damp, gritty, weakly stratified
48-87	C2	SAND	10YR 4/6 Dark yellow brown		Loose, structurless, med. to coarse grained, stratified and well graded, saturated below 69", 15% gravel

DEEP OBSERVATION HOLE LOG
Deep Hole No. 09c Depth to Groundwater: 45" Depth to Bedrock: >106"
Estimated Seasonal High Water Table : 39" Common, medium and distinct

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other Structure, Stones, Boulders, % Gravel
0-12	Ap	SANDY LOAM	10YR 3/2 dark yellowish brown	ND	Very friable. med. granular- moderate grade, damp, many fine roots, clear smooth boundary
12-20	Bw	SANDY LOAM	10YR 5/8 dark yellowish brown	ND	Very frialble. fine to med.blocky. moderate grade, damp, common fine roots, clear smooth boundary
20-53	C1	SAND	10YR 6/3 light olive brown	@45"	Structurelesss, loose, clean, fine to med. grained, weakly stratified diffuse wavy boundary
53-106	C2	SAND	10YR 5/6 Dark yellow brown		Structurless, loose, med. to coarse grained, sand, damp weakly stratified, clean 15-20% gravel

DEEP OBSERVATION HOLE LOG
Deep Hole No. 4 Depth to Groundwater: 50" Depth to Bedrock: 91"+
Estimated Seasonal High Water Table : 41" Common, medium and distinct

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other Structure, Stones, Boulders, % Gravel
0-19	Ap	SANDY LOAM	10YR 3/2 dark grayish brown		Friable. med. blocky. weak grade, fine grained, damp fine grass roots, smooth clear boundary
19-24	Bw	SANDY LOAM	7.5YR 4/4 brown		Friable. med.angular blocky. weak grade, fine grained, damp,fine grass roots, diffuse wavy boundary
24-66	C1	LOAMY SAND	2.5Y 5/4 light olive brown	@41" 10Y 7/1 7.5 YR 3/6 (c,2,d)	V. Friable, structurelesss, moderate grade, fine to med. grained, damp, gritty, weakly stratified
66-61	C2	SAND	10YR 4/6 Dark yellow brown		Loose, structurless, med. to coarse grained, stratified and well graded, saturated below 69", 15% gravel

DEEP OBSERVATION HOLE LOG
Deep Hole No. 09D Depth to Groundwater: 70" Depth to Bedrock: >113"
Estimated Seasonal High Water Table : 70"

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other Structure, Stones, Boulders, % Gravel
0-32	C	Sand & Loam Mix	10YR 3/2 very dark gray	ND	Human transported material, very friable, structureless damp, mechanical mix of sand, gravel & loam
0-12	Ap	SANDY LOAM	10YR 3/2 dark yellowish brown	ND	Very friable. med. granular- moderate grade, damp, many fine roots, clear smooth boundary
12-20	Bw	SANDY LOAM	10YR 5/8 dark yellowish brown	ND	Very frialble. fine to med.blocky. moderate grade, damp, common fine roots, clear smooth boundary
25-35	C1	SAND	10YR 6/4 dark yellowish brown	ND	Friable, massive blocky (med.), fine grained, damp, mod. silty, slightly gritty diffuse wavy boundary
35-113	C2	SAND	2.5YR 5/6 Dark yellow brown	@70"	Structurless, loose, med. to coarse grained, sand, damp weakly stratified, clean 15-20% gravel

ELEVATION SUMMARY

DEEP OBSERVATION HOLES

OBSERVATION HOLE No.	1	2	3	4	09 A	09 B	09 C	09 D
GRADE EL.	57.8	58.1	57.0	57.02	60.5	59.6	56.9	59.3
GROUNDWATER EL.	54.13	54.93	53.75	53.60	51.33	50.44	53.15	51.47
BOTTOM EL.	49.97	50.68	49.75	49.42	51.33	50.44	48.07	47.88

PERCOLATION TEST DATA

	TP 2	TP 4	TP 3	TP 09-1
PERC RATE:	< 2MPI	2.3 MPI	< 2MPI	< 2 MPI
TEST DEPTH:	43"	45"	52"	42"

OPERATION AND MAINTENANCE PLAN – PROPOSED SEPTIC SYSTEM

1. SEPTIC TANKS
   (a) Septic Tanks shall be inspected quarterly and pumped when the combined depth of scum and sludge is expected to exceed 1/4 of the liquid depth of the tank before the next inspection,
   (b) Dual effluent filters are installed on the outlet of all secondary septic tanks (5 total). The filters shall be cleaned at least annually when the tank is inspected.
2. SEWER MANHOLES
   Sewer Manholes A, B and C shall be inspected annually. Manholes and associated piping shall be cleaned of any accumulated solids.
3. DOSING CHAMBER
   Dosing chamber, pumps and controls shall be inspected on an annual basis. Sludge or solids shall be removed from the chamber. Elapsed time meters for pumps shall be read and noted, as well as proper operation of all pumps and float switches. Annual bed dosing changeover shall be done and checked for proper operation.
4. LEACH BEDS
   Liquid levels in all monitoring wells shall be measured and recorded. Surface stability shall be inspected and any evidence of breakout noted. All vent pipes shall be inspected as to condition.
5. WATER METER READINGS
   Water meter readings for the preceding 12 months shall accompany the inspection report.
6. INSPECTION REPORT
   The results of items 1 – 5, above, shall be documented in an annual report, a copy of which shall be submitted to the Board of Health prior to the end of the calender year.

MATERIALS SUMMARY – DOSING SYSTEM

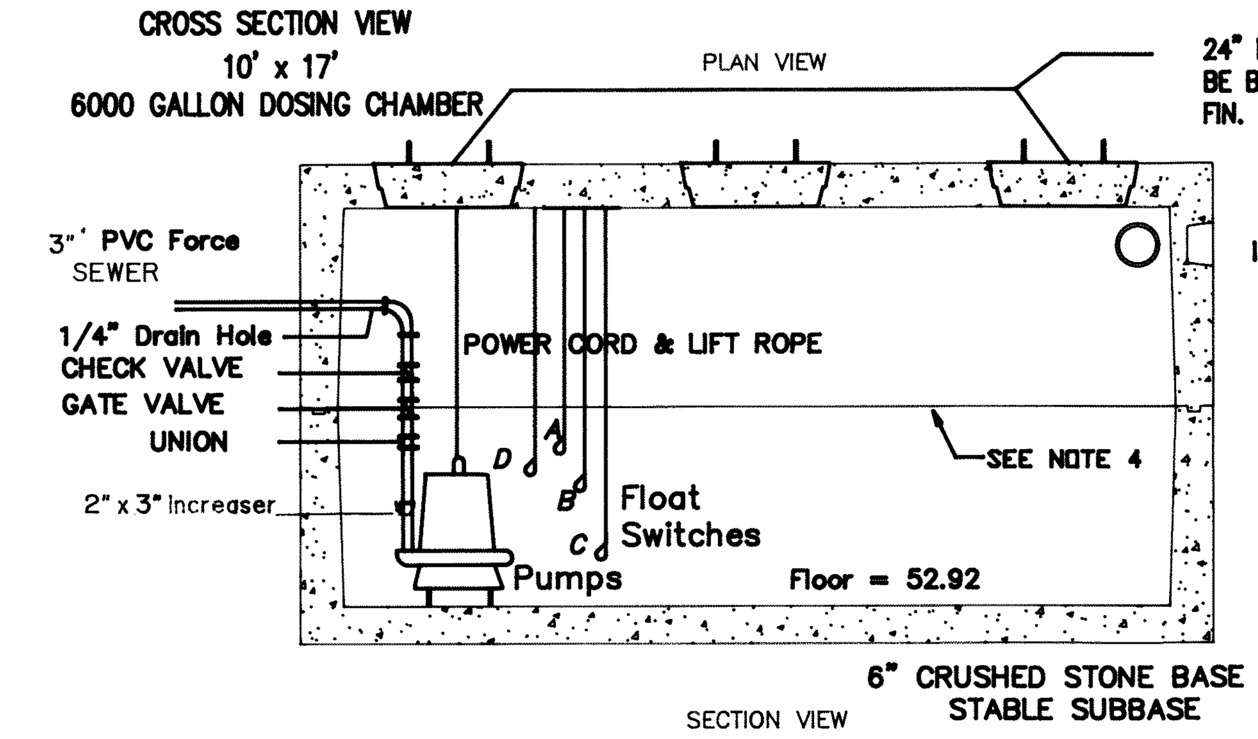
COMPONENT	MANUFACTURER & MODEL	No.
PUMPS	BARNES 2 SEV-L 3/4 HP, 2" DISCH.	2
PUMP CHAMBER	SHEA CONCRETE PRODUCTS 6000 GAL	1
CONTROL PANEL	PER PUMP MFGR. RECOMMENDATIONS	1
LEVEL CONTROLS	PER PUMP MFGR. RECOMMENDATIONS	4

DOSING CHAMBER SIZING CALCULATIONS:
DAILY FLOW (REQ'D STORAGE) = 3600 GALLON
DOSE + DRAINBACK VOLUME = 243 GALLONS

TOTAL VOLUME = 3843 GALLONS

WITH A 9' x 16' INSIDE DIMENSION, EACH FOOT REPRESENTS 1077 GALLONS

PUMP OFF = 54.00 + 3843/1077 = 57.57
INLET ELEVATION = 58.75
FREEBOARD = 1.18 FEET



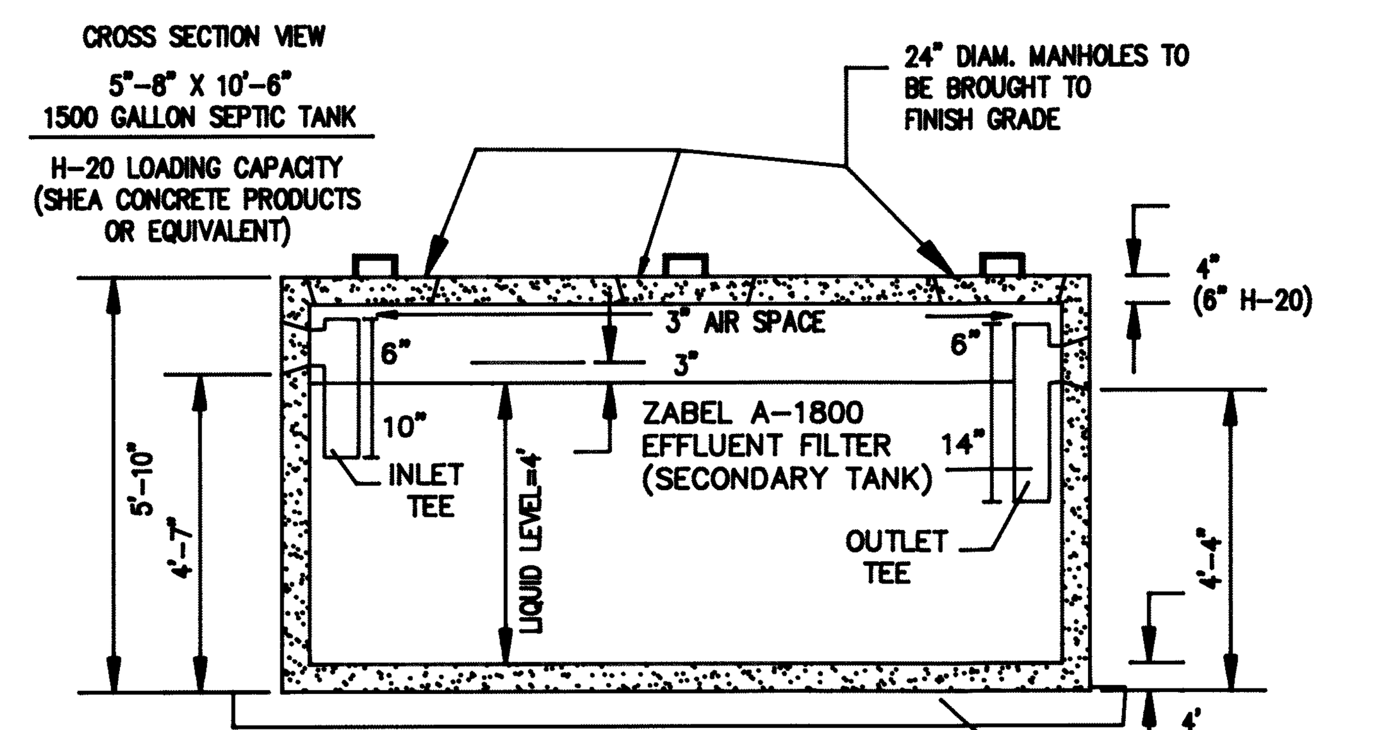
NOTES, PUMP CHAMBER
1. CONCRETE: 5,000 PSI MINIMUM AFTER 28 DAYS.
2. ALL REINFORCEMENT PER ASTM C1227-93.
3. DESIGNED FOR H-20 LOADING.
4. TONGUE & GROOVE JOINT SEALED WITH BUTYLE RESIN.
5. PUMP CHAMBER SHALL BE MADE FULLY WATERTIGHT.

TABLE OF ELEVATIONS
A: ALARM ON = 54.50
B: LEAD PUMP ON = 54.23
D: LAG PUMP ON = 54.30
C: PUMP OFF = 54.00

NOTES – PROPOSED PUMP SYSTEM
1. PROPOSED PUMPS SHALL BE CAPABLE OF DISCHARGING 70 GALLONS PER MINUTE AGAINST A TOTAL HEAD OF 13 FEET.
2. NUMBER OF DOSES PER DAY = 18
3. PUMP ALARM CIRCUITS SHALL BE WIRED SEPARATE FROM PUMP POWER CIRCUITS.
4. THE PUMP ALARM SYSTEM SHALL BE EQUIPPED WITH AN AUTOMATIC DIALER TO THE COMPANY PROVIDING SYSTEM MAINTENANCE.
5. PUMPS SHALL ALTERNATE

TANKS FOR UNITS 1-24

NOTE : 2 TANKS ARE REQUIRED FOR EACH BUILDING

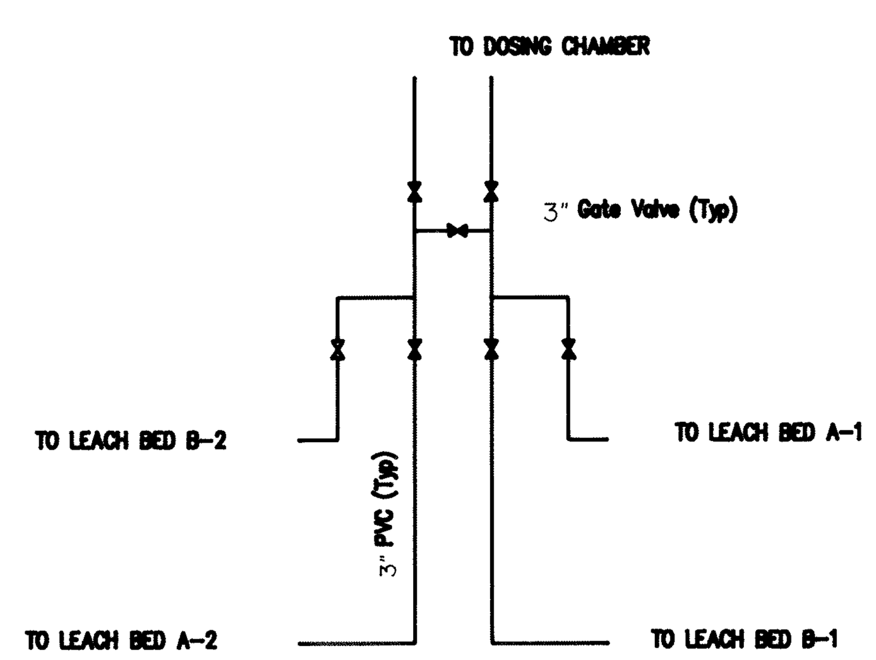


SEPTIC TANK SHALL CONFORM IN ALL RESPECTS TO THE REQUIREMENTS OF TITLE 5, SECTIONS 15.223, 15.226, 15.227 AND 15.228
TANK SHALL BE CAPABLE OF WITHSTANDING AN H-20 WHEEL LOADING
TANK SHALL BE OF MONOLITHIC CONSTRUCTION
OUTLET FILTERS SHALL BE ZABEL A-1800, 4 x 18

SEPTIC TANK SIZING :

UNITS 1-24 : 4 UNITS PER BUILDING
REQUIRED TANK SIZE = 4 x 150 x 2 = 1200 GALLON
PROPOSED TANK SIZE = 1500 GALLONS

NOTE: DOSING SYSTEM SHALL ALTERNATELY DOSE BEDS A-1 AND B-1 FOR A ONE YEAR PERIOD & BEDS A-2 AND B-2 FOR A ONE YEAR PERIOD.



PIPING SCHEMATIC AT VALVE CHAMBER
NO SCALE

FOR REGISTRY USE ONLY

NOTES

1. SAFETY MEASURES, DAY-TO-DAY CONTROL OF THE WORK AND CONSTRUCTION METHODS SHALL BE THE RESPONSIBILITY THE CONTRACTOR.
2. PROPOSED BUILDING FOUNDATION CONFIGURATION AND LOCATION ON THE LOT AS SHOWN HEREON SHALL BE VERIFIED AS TO CONFORMANCE WITH FINAL ARCHITECTURAL PLANS AND ZONING BY-LAWS PRIOR TO ANY CONSTRUCTION.
3. UNLESS SPECIFIED OTHERWISE HEREON, SYSTEM CONSTRUCTION SHALL CONFORM TO TITLE 5 OF THE STATE ENVIRONMENTAL CODE
4. NO CHANGES ARE TO BE MADE IN THE FIELD WITHOUT PRIOR APPROVAL BY THE DESIGN ENGINEER AND THE TOPSFIELD BOARD OF HEALTH.
5. THE SEPTIC SYSTEM SHALL BE CONSTRUCTED BY A DISPOSAL WORKS INSTALLER LICENSED BY THE TOWN OF TOPSFIELD. THE CONTRACTOR SHALL NOTIFY THE BOARD OF HEALTH AND THE DESIGN ENGINEER 48 HOURS PRIOR TO REQUIRED INSPECTIONS
6. ANY ERRORS, OMISSIONS AND CHANGE OF CONDITIONS AT THE SITE SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO PERFORMING THE RELATED WORK.
7. NO WELL IS TO BE LOCATED WITHIN 100 FEET OF THE LEACHING FACILITY NOR SHALL THE LEACH FACILITY BE LOCATED WITHIN 100 FEET OF ANY WELL
8. THE ISSUANCE OF A CONSTRUCTION PERMIT AND/OR A CERTIFICATE OF COMPLIANCE SHALL NOT IMPLY A GUARANTEE THAT THE SUBSURFACE SEWAGE DISPOSAL SYSTEM WILL FUNCTION SATISFACTORILY.
9. CONSTRUCTION OF LEACHING FACILITIES IN CLEAN GRANULAR FILL: CLEAN GRANULAR FILL SHALL BE AS DEFINED IN THE STATE ENVIRONMENTAL CODE, TITLE 5, REGULATION 15.255(3), SHALL HAVE A PERCOLATION RATE BETTER THAN 2 MINUTES PER INCH IN ITS NATURAL STATE AND AFTER PLACEMENT AND SHALL BE GRADED AND PLACED PER 15.255(3)-(6)
10. THE PROPOSED SEPTIC SYSTEM IS NOT DESIGNED FOR THE USE OF GARBAGE GRINDERS.
11. FINISH GRADE OVER THE LEACHING AREA SHALL HAVE A MINIMUM SLOPE OF TWO (2) PERCENT.
12. ALL STONE SHALL BE DOUBLE WASHED, SHALL BE FREE FROM IRON FINES, DUST & ORGANIC MATTER AND OF THE SIZES SHOWN HEREON.
13. DESIGN ENGINEER SHALL SUBMIT AN AS-BUILT PLAN OF THE SEPTIC SYSTEM WITHIN TWO WEEKS OF CONSTRUCTION COMPLETION.
14. THIS PLAN IS DESIGNED IN CONFORMANCE WITH 310 CMR 15.00 (TITLE 5)
15. PIPE SPECIFICATIONS
    DWELLING TO SEPTIC TANK : 4" SCH. 40 PVC SOLID WALL
    SEWER MAINS – 8" SDR 35 PVC SOLID WALL
    SEE SHEET 11 FOR PRESSURE DISTRIBUTION PIPING
    ALL PIPE FITTINGS SHALL BE OF THE SAME SCHEDULE AS PIPE USED & INSTALLED IN ACCORDANCE WITH MFGR. RECCOMENDATIONS AND THE REQUIREMENTS OF TITLE 5.
16. THIS PLAN IS DESIGNED IN CONFORMANCE WITH THE TOPSFIELD BOARD OF HEALTH SUPPLEMENTAL REGULATIONS TO 310 CMR 15.00

DESIGN CRITERIA – SOIL ABSORPTION SYSTEM

1. BULIDING TYPE: ELDERLY HOUSING
2. NO. OF UNITS : 24
3. DESIGN FLOW: 24 x 150 GAL/UNIT/DAY = 3600 GAL\DAY
4. DESIGN PERCOLATION RATE: 1" IN 5 MINUTES
5. GARBAGE DISPOSAL : YES ___ NO X
6. LEACH AREA REQUIREMENTS (SQ. FT PER GALLON)
   BOTTOM: 0.74 SIDE: 0.74
7. TOTAL LEACH AREA REQUIRED:
   LOCAL CODE: 4865 SQ. FT. TITLE 4865 SQ. FT.
   PROVIDED:
   BOTTOM: 4928 SQ. FT. x 0.74 GAL/SQ. FT. = 3647 GAL
   SIDE: SQ. FT. x 0.74 GAL/SQ. FT. = GAL

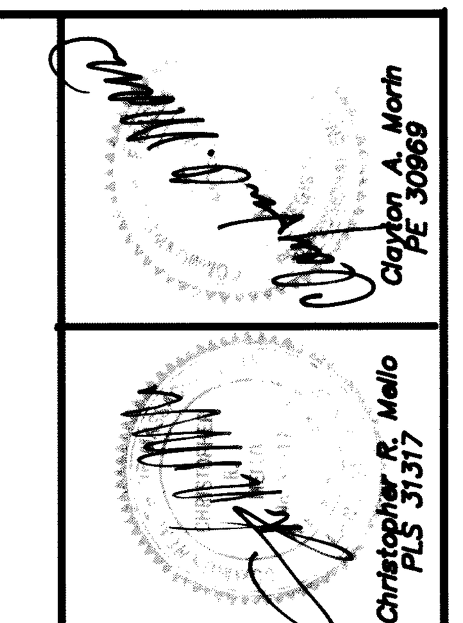
   TOTAL: 4928 SQ. FT. OR 3647 GAL/DAY
8. LEACH AREA : 3-44' WIDE BY 56 FOOT LONG LEACH BEDS

   PRESSURE DOSED (BEDS A-1 , A-2 AND B-1)
   LEACH AREA : 36' WIDE BY 68.5 FOOT LONG LEACH BED
   PRESSURE DOSED (BED B-2)

Approved by the Topsfield Planning Board

Date Filed

I HEREBY CERTIFY THAT THIS PLAN CONFORMS TO THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS OF THE COMMONWEALTH OF MASSACHUSETTS



SCALE 1" = AS NOTED

DATE: September 2, 2008

REVISIONS
1. JUNE 1, 2009
2. JULY 9, 2009
3. SEPTEMBER 16, 2009

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SITE DEVELOPMENT PERMIT PLAN
NEW MEADOWS
TOPSFIELD, MASSACHUSETTS
SEPTIC SYSTEM DETAILS

F 14730

SHEET NO.
10 OF 14